REMARKS

In view of the above amendments and following remarks, reconsideration of the rejections that are contained in the Office Action of July 9, 2008 is respectfully requested.

Claims 30, 31, 34, 35 and 38-39 were rejected by the Examiner as being anticipated by the newly cited reference to Shiyama, JP 08083997 (Shiyama). The record includes both the Japanese language document as well as a machine translation, which will be referenced below. The Examiner further rejected claims 32 and 37 as being unpatentable over Shiyama in view of Yamamoto, WO 01/43523, the Examiner using U.S. Patent 7,065,864 as an English language equivalent to the PCT document. However, it is respectfully submitted that the present invention clearly patentably distinguishes over both Shiyama and Yamamoto, particularly as now set forth in claim 30 as amended above.

The Present Invention

As noted, claim 30 has been amended to explicitly set forth several additional steps. First, the vacuum pressure achieved by one of the nozzles when picking up a component is detected. The component that is picked up by one of the nozzles is then recognized by moving the one of the nozzles to a position opposing a component recognition device. After the one of the nozzles is passed over the component recognition device, relative vacuum pressure decrease of the one of the nozzles, compared to the achieved vacuum pressure of the one of the nozzles that was detected when picking up the component, is detected. As previously recited, a judgement is then made that one of the nozzles has lost the component due to dropping of the component. This judgement is made if the detected relative vacuum pressure decrease of the one of the nozzles exceeds a predetermined first threshold. In this case, the component mounting operation is skipped.

Support for the above limitations is for example found in the original English language specification beginning at line 19 at page 33, and continuing at least at line 12 at page 36. Reference in that description is made to the flow chart of Fig. 5. In particular, as discussed on page 35, at step number 6 the achieved vacuum pressure is initialized to zero. At step number 7, the mounting head is moved to a position where a mounting operation is to be performed. Possible component loss

which may occur after component recognition scanning is then made. As discussed continuing to page 36, the procedure for making the judgement is that the vacuum pressure decrease from the initialized zero point, which is a relative value, is measured. If the measured pressure decrease is bigger than a predetermined first threshold, it may be judged that the component has been lost. The component mounting operation, as further discussed on page 36, is then skipped.

In other words, claim 30 reflects that after the component has been recognized by the component recognition device, and after the one of the nozzles has passed over the component recognition device, there is still a further detection of the relative vacuum pressure, the detection being with respect to the achieved vacuum pressure upon picking up the nozzle as a basis. The judgement is then made that the one of the nozzles has lost the component if that detected relative vacuum pressure decrease exceeds the predetermined first threshold. Such is not disclosed or suggested by Shiyama.

Claim 30 is not Anticipated by Shiyama

On page 3 of the Office Action, the Examiner states that Shiyama detects the vacuum pressure decrease of one of the nozzles relative to a vacuum pressure to be achieved at a time of picking up a component by the one of the nozzles, the detecting occurring after the one of the nozzles has passed over a component recognition device. The Examiner further states that Shiyama makes a judgement that the nozzle has lost the component if the vacuum pressure decrease exceeds a predetermined first threshold.

What paragraph 28 of Shiyama states, however, is that "when vacuum pressure falls exceeding tolerance level rather than normal vacuum pressure by this detection operation (i.e., when the value approaching atmospheric pressure is detected), parts 5 judge that it fell from the adsorption nozzle 14. Or when predetermined vacuum pressure is not obtained [from] immediately after carrying out adsorption operation, parts 5 judge it as what was not adsorbed. When it is judged that there are no parts 5 in this way, wearing operation at the wearing station III by this nozzle 14 mentioned later is not performed, and a solenoid valve 21 is changed to the atmospheric pressure side."

In paragraph 29 it is stated that "if a head 15 moves to the recognition station II by rotation of a rotary table 13, recognition of the position gap to the nozzle 14 of the parts 5 by which the adsorption nozzle 14 is adsorbed will be performed . . . the pressure which the pressure sensor 25 in the timing of the pulse which the time generator 41 outputs also while being this movement although a head 15 moves to the wearing station III by rotation of a rotary table 13 detected is judged. When vacuum pressure falls, it is judged as that whose parts 5 were lost."

Thus, from what can be gleaned of the operation of Shiyama, it appears that a basic difference between the present invention and that of Shiyama is that Shiyama is detecting an absolute vacuum pressure. That is, it appears that Shiyama uses a technique of detecting the absolute vacuum pressure which is to be compared with a predetermined absolute threshold. Note the reference in paragraph 28 to the vacuum pressure falling, and exceeding the tolerance level, as being equated with when the value approaches atmospheric pressure.

Generally speaking, a plurality of such and nozzles are connected with a single vacuum pressure source and used to pick up a plurality of components at one time or at short intervals. See for example Fig. 4 of the present application. If there is a vacuum leak at one specific nozzle, for example due to a gap that is created between the nozzle and the component, caused for a reason such as a problem in the picking-up operation, the vacuum pressure that is achieved at each nozzle becomes unstable and may vary when suctioning the component, because the vacuum source for each of the nozzles is the same. If an absolute vacuum pressure is used as the threshold, as in the case of Shiyama, a proper judgement may not be conducted as to whether each of the nozzles continues to hold the picked up component, because of the unstable vacuum pressure occurring. If the nozzle is in position before it passes over the recognition device, the improper condition of the component that is suctioned by a particular nozzle may be detected by the device. But if the component drops after the nozzle passes over the device, improper condition of the component may no longer be detected by a device such as Shiyama's. Even further, the vacuum pressure at the vacuum pressure source itself may not always be stable, even during normal conditions, which can also cause an erroneous judgement with the arrangement of Shiyama.

By contrast, with the present invention as reflected by now amended claim 30, there is a vacuum pressure detection that occurs at least two times during the component mounting operation. The first time, as reflected by claim 30, is to detect the achieved vacuum pressure when picking up the component with one of the nozzles. The second time is to detect a relative vacuum pressure decrease of the one of the nozzles, compared to the achieved vacuum pressure that was detected as a basis point. The second detection, as recited in the claim, is carried out after the one of the nozzles has passed over the component recognition device.

Accordingly, with the present invention as set forth in claim 30, instability in the vacuum pressure or a variance of the vacuum pressure does not affect the judgement whether the nozzle continues to hold the picked up component. This is because the threshold that is used in the present invention is not an absolute vacuum pressure, as in the case of Shiyama, but a relative vacuum pressure. This makes it possible to perform the detection operation more accurately. Again, this is reflected in claim 30 by the requirement that a judgement is made that the nozzle has lost the component if the detected relative vacuum pressure decrease exceeds a predetermined first threshold.

Shiyama neither discloses nor suggests any such operation. Indeed, what is described in Shiyama does not appear to be anymore than the technique that is described in the prior art section of the present specification from line 6 of page 7 to line 24 of page 8 of the original English language specification.

Yamamoto Does not Cure the Deficiencies of Shiyama

Yamamoto was cited by the Examiner as disclosing imaging of nozzles of a component mounting apparatus with an imaging device. However, Yamamoto does not cure the above deficiencies of Shiyama.

Conclusion

From the above it is respectfully submitted to be clear that independent claim 30, as well as all of the remaining claims which all depend from claim 30 clearly patentably distinguish over both Shiyama and Yamamoto. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

Takashi MAEDA et al.

/Nils E. Pedersen/
2008.10.09 15:44:02 -04'00'

By: _____

Nils E. Pedersen
Registration No. 33,145
Attorney for Applicants

NEP/krg
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
October 9, 2008